



Shear Certificate Packet

For

Tana Exploration

Job Number: 4934

12 October 2011

P.O. Box 577
Brookshire, TX 77423
U.S.A



Tel: (281) 375-5515
Fax: (281) 934-1600
west@westengineer.com

Mr. Ian Johnston
Drilling Engineer
Tana Exploration

13 October 2011

Subject: Shear Verification per 30 CFR §250.416(e)

Dear Mr. Johnston:

Please find attached the Blind-Shear Ram Certificate and related documents for the stated calculation case. The calculations were carried out according to Cameron EB702 D Rev B10 and utilize both the Dimensional and PPF methods. Background equations used for the calculations are shown on each shear calculation spreadsheet near the required shear pressure output cells. Additionally, relevant shear test documentation is included. Should you have any questions or concerns, please feel free to contact us.

Based on the client supplied input data, actual shear test report values and WEST shear calculations, the certified pipe is the hardest pipe to shear in this well program; therefore, the certified pipe also qualifies the other pipe sizes. WEST has used the submitted MASP for calculations and also considers this certification valid for any MASP of lower value.

Sincerely,

Originally sent via email

A handwritten signature in blue ink, appearing to read "E.G. Childs".

E.G (Greg) Childs,
for WEST Engineering Services, Texas Registration No. F-4672

WEST Job Number: 4934

Table of Contents

Packet Sections:

1. Cover Letter
2. Blind-Shear Ram Certificate
 - a. 5" OD, 0.362" wall, S-135 Drill Pipe Shear Certificate
 - b. 3.5" OD, 0.368" wall, S-135 Drill Pipe Shear Certificate
 - c. 2.875" OD, 0.362" wall, S-135 Drill Pipe Shear Certificate
3. Theoretical Results, with corrections for MASP
4. Tested Pipe Results, with corrections for MASP
5. Shear Calculation Input Data Sheet
6. Shear Calculations
 - a. Test results from pipe requiring highest shear pressure
 - b. Calculations of shearing capability of all pipe to be used in the well, including correction for MASP
7. Shear Test Report (including chart recorder graph)
 - a. 5" OD, 0.362" wall, S-135 Shear Test from Church ER112B on 6.24.10
8. Statement of Qualifications
9. Texas State PE Certificate
10. Letter Attesting No Violation of Law
11. Insurance Certificate

P.O. Box 577
 Brookshire, TX 77423
 U.S.A



ISO 9001 Certified

Tel: (281) 375-5515
 Fax: (281) 934-1600
 west@westengineer.com

Blind-Shear Ram Certificate

In accordance with 30 CFR §250.416(e), **Verification that Blind-shear Rams will Shear Pipe in the Hole**, this certificate verifies that, based on cited calculation method, data provided to WEST Engineering, and actual testing, the equipment listed below is capable of shearing the specified pipe.

NOTE – Certification is only valid for fully functional equipment maintained according to manufacturers and API requirements and operated within design and testing standards as specified within API Specification 16A. This certification assumes the same BOP equipment (i.e., blind-shear rams of the same make, model, and size as proposed for the operation) is utilized in all cases. Calculations are based on client Input Data Sheet found as Section 5.

| Client: | Tana Exploration |
|---|--|
| West Job Number: | 4394 |
| Operator: | Tana Exploration |
| EQUIPMENT / CALCULATION INFORMATION | |
| BOP: | Cameron 13-5/8" – 10K U BOP |
| Type of Shear Operator: | LBT (Large bore Shear Bonnet equipped with booster assembly) |
| Type of Shear Ram: | ISR (Interlocking Shear Ram) |
| Hydraulic Pressure Supplied to Operator: | 2,850 psi |
| Maximum Wellbore Pressure at BOP (MASP): | 10,000 psi |
| Tested Pipe: See Section 4 | 5" OD, 0.362" wall, S-135 |
| Certified Pipe: See Section 3 | 5" OD, 0.362" wall, S-135 |
| Certified Pipe Nominal Yield Strength: | 135,000 psi |
| Certified Pipe Theoretical Shear Pressure Corrected for Wellbore Pressure Effects: | 2,826 psi |
| Calculation Method: | Cameron EB 702 D, Rev B10 Dimensional & PPF Methods |

Calculations Performed by: Jon Heerensperger Date: 13 October 2011

Calculations Approved by: Covey Hall Date: 13 October 2011

Certificate Approval:  Date: 13 October 2011

E.G. (Greg) Childs,
 for WEST Engineering Services,
 Texas Registration No. F-4672

P.O. Box 577
 Brookshire, TX 77423
 U.S.A



ISO 9001 Certified

Tel: (281) 375-5515
 Fax: (281) 934-1600
 west@westengineer.com

Blind-Shear Ram Certificate

In accordance with 30 CFR §250.416(e), **Verification that Blind-shear Rams will Shear Pipe in the Hole**, this certificate verifies that, based on cited calculation method, data provided to WEST Engineering, and actual testing, the equipment listed below is capable of shearing the specified pipe.

NOTE – Certification is only valid for fully functional equipment maintained according to manufacturers and API requirements and operated within design and testing standards as specified within API Specification 16A. This certification assumes the same BOP equipment (i.e., blind-shear rams of the same make, model, and size as proposed for the operation) is utilized in all cases. Calculations are based on client Input Data Sheet found as Section 5.

| Client: | Tana Exploration |
|---|--|
| West Job Number: | 4394 |
| Operator: | Tana Exploration |
| EQUIPMENT / CALCULATION INFORMATION | |
| BOP: | Cameron 13-5/8" – 10K U BOP |
| Type of Shear Operator: | LBT (Large bore Shear Bonnet equipped with booster assembly) |
| Type of Shear Ram: | ISR (Interlocking Shear Ram) |
| Hydraulic Pressure Supplied to Operator: | 2,850 psi |
| Maximum Wellbore Pressure at BOP (MASP): | 10,000 psi |
| Tested Pipe: See Section 4 | 5" OD, 0.362" wall, S-135 |
| Certified Pipe: See Section 3 | 3.5" OD, 0.368" wall, S-135 |
| Certified Pipe Nominal Yield Strength: | 135,000 psi |
| Certified Pipe Theoretical Shear Pressure Corrected for Wellbore Pressure Effects: | 2,122 psi |
| Calculation Method: | Cameron EB 702 D, Rev B10 Dimensional & PPF Methods |

Calculations Performed by: Jon Heerensperger Date: 13 October 2011

Calculations Approved by: Covey Hall Date: 13 October 2011

Certificate Approval:  Date: 13 October 2011

E.G (Greg) Childs,
 for WEST Engineering Services,
 Texas Registration No. F-4672

P.O. Box 577
 Brookshire, TX 77423
 U.S.A



Tel: (281) 375-5515
 Fax: (281) 934-1600
 west@westengineer.com

ISO 9001 Certified

Blind-Shear Ram Certificate

In accordance with 30 CFR §250.416(e), **Verification that Blind-shear Rams will Shear Pipe in the Hole**, this certificate verifies that, based on cited calculation method, data provided to WEST Engineering, and actual testing, the equipment listed below is capable of shearing the specified pipe.

NOTE – Certification is only valid for fully functional equipment maintained according to manufacturers and API requirements and operated within design and testing standards as specified within API Specification 16A. This certification assumes the same BOP equipment (i.e., blind-shear rams of the same make, model, and size as proposed for the operation) is utilized in all cases. Calculations are based on client Input Data Sheet found as Section 5.

| | |
|---|--|
| Client: | Tana Exploration |
| West Job Number: | 4394 |
| Operator: | Tana Exploration |
| EQUIPMENT / CALCULATION INFORMATION | |
| BOP: | Cameron 13-5/8" – 10K U BOP |
| Type of Shear Operator: | LBT (Large bore Shear Bonnet equipped with booster assembly) |
| Type of Shear Ram: | ISR (Interlocking Shear Ram) |
| Hydraulic Pressure Supplied to Operator: | 2,850 psi |
| Maximum Wellbore Pressure at BOP (MASP): | 10,000 psi |
| Tested Pipe: See Section 4 | 5" OD, 0.362" wall, S-135 |
| Certified Pipe: See Section 3 | 2.875" OD, 0.362" wall, S-135 |
| Certified Pipe Nominal Yield Strength: | 135,000 psi |
| Certified Pipe Theoretical Shear Pressure Corrected for Wellbore Pressure Effects: | 1,797 psi |
| Calculation Method: | Cameron EB 702 D, Rev B10 Dimensional & PPF Methods |

Calculations Performed by: Jon Heerensperger Date: 13 October 2011

Calculations Approved by: Covey Hall Date: 13 October 2011

Certificate Approval:  Date: 13 October 2011

E.G (Greg) Childs,
 for WEST Engineering Services,
 Texas Registration No. F-4672

Section 3

Theoretical Results obtained by stated calculation method,
corrected for MASP

Source: Client Input Data Sheet; Section 5

Summary Table of Calculated Theoretical Results:

| Pipe | MASP [psi] | Shear Pressure [psi] | Comment |
|-------------------------------|-------------------|-----------------------------|----------------------|
| 5" OD, 0.362" wall, S-135 | 10,000 | 2,826 | Tested and Certified |
| 3.5" OD, 0.368" wall, S-135 | 10,000 | 2,122 | Certified Pipe |
| 2.875" OD, 0.362" wall, S-135 | 10,000 | 1,797 | Certified Pipe |

Section 4

Tested Pipe Results obtained from Shear Test Report,
corrected for MASP

Source: Shear Test Report; Section 7

Summary of Table of Tested Pipe Results:

| | |
|---|---------------------------|
| Tested Pipe: | 5" OD, 0.362" wall, S-135 |
| Tested Pipe Nominal Yield Strength: | 135,000 psi |
| Tested Pipe Actual Shear Pressure: | 1,000 psi |
| Tested Pipe Actual Shear Pressure Corrected for Wellbore Pressure: | 1,581 psi |
| Tested Pipe Theoretical Shear Pressure Corrected for Wellbore Pressure: | 2,826 psi |

Section 5



Shear Calculation Input Data

WEST is preparing to perform shear verification as required by 30 CFR §250.416(e). Please input information where indicated in the template below and return to WEST Engineering Services via email to **ntl@westengineer.com**. Please enter data carefully, as any subsequent changes may have cost & schedule impact.

- If the requested data is not relevant, please enter "N/A" for Not Applicable.
- Please enter data for each situation (e.g. pipe size & MASP) to be calculated.

| Equipment | | | | | | | |
|--|--|--------------|---------------------|----------------------------|-------------------------|--------------------------------|-----------|
| BOP Original Equipment Manufacturer (Shaffer, Cameron, etc.) | Cameron | | | | | | |
| Ram BOP Model Designation (U, TL, SL, etc.) | Type U | | | | | | |
| BOP Size and Pressure Rating (18 3/4" - 15K, etc.) | 13-5/8"-10K | | | | | | |
| Shear Operator Configuration or Bonnet Size (SBT, LBT, etc.) | LBT (W/Boosters) | | | | | | |
| Shear Ram Type (Ram Design) | ISR | | | | | | |
| Shear Operator Closing Area (if non-Cameron) [sq. inches] | | | | | | | |
| Shear Operator Closing Ratio (if non-Cameron) | | | | | | | |
| Control Fluid Pressure Gradient [psi/ft]* | 0.442 | | | | | | |
| Seawater Pressure Gradient [psi/ft]* | 0.445 | | | | | | |
| Elevation of HPU above Sea Level [ft]** | 100' | | | | | | |
| Hydraulic Pressure Supplied to Operator on Closing Side [psi] | 2850 Pressure switch setting (3000 WP) | | | | | | |
| Bonnet Pressure Rating [psi] | 3000 | | | | | | |
| Tubular Information Required | | | | | | | |
| No. | Pipe OD [in] | Pipe ID [in] | Wall Thickness [in] | Pipe Weight per Foot [ppf] | Pipe Grade (e.g. S-135) | Yield Strength (Nominal) [psi] | Comments |
| 1 | 5 | 4.276 | 0.362 | 19.5 | S135 | 135000 | R-II Pipe |
| 2 | 3.5 | 2.764 | 0.368 | 13.3 | S135 | 135000 | |
| 3 | 2.875 | 2.151 | 0.362 | 10.4 | S135 | 135000 | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| Well Information | | | | | | | |
| Existing WEST Job # or New Purchase Order No. (if new job) *** | | | | | | 4934 | |
| Rig Name | | | | | | N/A | |
| Drilling Contractor (rig owner) | | | | | | Hercules | |
| Operator (oil company) | | | | | | Tana Exploration | |
| Well Name | | | | | | N/A | |
| Water Depth [ft]* | | | | | | Max 195' | |
| MASP (Maximum Anticipated Surface Pressure) [psi] | | | | | | 10,000 | |

* This is necessary to accurately calculate the hydrostatic head.

*** - FR# if PO# is unavailable

** The marine or barge dept. should be able to provide this information

| | |
|---|-----------|
| Ian Johnston | 9/14/2011 |
| Information provided by (please print name above) | Date |

Requested Delivery Date for Shear Certification:

Date

Your service request will be picked up as soon as team member availability allows. However, you should not expect turn around for shear verification requests within less than 7 days.

Also, please note that subsequent changes to input data are likely to delay certification.

Section 6.a
Test Pressure Compensated for Wellbore Pressure
Cameron 13 5/8" - 10K U BOP, LBT, ISR
5" OD, 0.362" wall, S-135

Increased Shear Pressure due to Pressure in the Wellbore

WEST Engineering Services

P_a - Actual Shear Pressure from Test

MASP - Maximum Anticipated Surface Pressure (in BOP)

C_r - BOP Closing Ratio (from table)

P_i - Increased Shear Pressure due to Pressure in the Wellbore

$$= \text{MASP} / C_r$$

$$P_t - \text{Total Shear Pressure} = P_a + P_i$$

| | |
|-------------|--------|
| P_a [psi] | 1,000 |
| MASP [psi] | 10,000 |
| C_r | 17.2 |

Increase in Shear Press., P_i 581 psi

Total Shear Pressure, P_t 1,581 psi

Input

Output

EB 702 D, Rev B10 SHEARING CAPABILITIES OF CAMERON SHEAR RAMS



| EQUIPMENT AND TUBULAR DATA | |
|---|-------------|
| BOP Type: | 13-3M/10M U |
| Ram Type: | ISR |
| Operator Type: | LBT |
| Wellbore Pressure [psi]: | 10000 |
| Tubular Yield [ksi]: | 135 |
| Tubular PPF: | 19.5 |
| Calculated Highest Shear Pressure [psi] | |
| 2826 | |

P_{shear} = Calculated required operator shear pressure (psi)
 P_w = Wellbore pressure at time of shear (psi)
 σ_{yield} = Minimum yield strength of the tubular material
 ppf = Nominal weight of the tubular (pounds per foot)
 C_1 = Operator constant corresponding to the piston closing area
 C_2 = Operator constant corresponding to the piston rod opening area
 C_3 = Constant corresponding to shear ram type / pipe grade

| DIMENSIONAL METHOD - To be used if the shear pressure calculations require the pipe outside and inside diameter. | | | | | | | | | | |
|--|----|-------|-------|-----|----|------|------|--------|---|---|
| | OD | Wall | ID | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
| Tubular Shear Data | 5 | 0.362 | 4.276 | 224 | 13 | 0.19 | 19.5 | 135000 | 2246 | 2826 |

| PPF METHOD - Calculates using the nominal weight of the tubular (pounds per foot). | | | | | | | |
|--|-----|----|------|------|--------|---|---|
| | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
| Tubular Shear Data | 224 | 13 | 0.19 | 19.5 | 135000 | 2233 | 2813 |

| Equations | PPF Method | Dimensional Method |
|-----------------------------------|--|---|
| No Wellbore Pressure (psi) | $P_{shear} = [C3 * ppf * \sigma_{yield}] / C1$ | $P_{shear} = [(C3 * \sigma_{yield}) * (pipeOD^2 - pipeID^2) * 2.92] / C1$ |
| Including Wellbore Pressure (psi) | $P_{shear} = [(C3 * ppf * \sigma_{yield}) + (Pw * C2)] / C1$ | $P_{shear} = [(C3 * \sigma_{yield}) * (pipeOD^2 - pipeID^2) * 2.92 + (Pw * C2)] / C1$ |



EB 702 D, Rev B10

SHEARING CAPABILITIES OF CAMERON SHEAR RAMS

| EQUIPMENT AND TUBULAR DATA | |
|---|-------------|
| BOP Type: | 13-3M/10M U |
| Ram Type: | ISR |
| Operator Type: | LBT |
| Wellbore Pressure [psi]: | 10000 |
| Tubular Yield [ksi]: | 135 |
| Tubular PPF: | 13.3 |
| Calculated Highest Shear Pressure [psi] | |
| 2122 | |

P_{shear} = Calculated required operator shear pressure (psi)
 P_w = Wellbore pressure at time of shear (psi)
 σ_{yield} = Minimum yield strength of the tubular material
 ppf = Nominal weight of the tubular (pounds per foot)
 C_1 = Operator constant corresponding to the piston closing area
 C_2 = Operator constant corresponding to the piston rod opening area
 C_3 = Constant corresponding to shear ram type / pipe grade

| DIMENSIONAL METHOD - To be used if the shear pressure calculations require the pipe outside and inside diameter. | | | | | | | | | | |
|--|-----|-------|-------|-----|----|------|------|--------|---|---|
| | OD | Wall | ID | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
| Tubular Shear Data | 3.5 | 0.368 | 2.764 | 224 | 13 | 0.19 | 13.3 | 135000 | 1542 | 2122 |

| PPF METHOD - Calculates using the nominal weight of the tubular (pounds per foot). | | | | | | | |
|--|-----|----|------|------|--------|---|---|
| | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
| Tubular Shear Data | 224 | 13 | 0.19 | 13.3 | 135000 | 1523 | 2103 |

| Equations | PPF Method | Dimensional Method |
|-----------------------------------|--|---|
| No Wellbore Pressure (psi) | $P_{shear} = [C3 * ppf * \sigma_{yield}] / C1$ | $P_{shear} = [(C3 * \sigma_{yield}) * (pipeOD^2 - pipeID^2) * 2.92] / C1$ |
| Including Wellbore Pressure (psi) | $P_{shear} = [(C3 * ppf * \sigma_{yield}) + (Pw * C2)] / C1$ | $P_{shear} = [(C3 * \sigma_{yield}) * (pipeOD^2 - pipeID^2) * 2.92 + (Pw * C2)] / C1$ |



EB 702 D, Rev B10 SHEARING CAPABILITIES OF CAMERON SHEAR RAMS

| EQUIPMENT AND TUBULAR DATA | |
|---|-------------|
| BOP Type: | 13-3M/10M U |
| Ram Type: | ISR |
| Operator Type: | LBT |
| Wellbore Pressure [psi]: | 10000 |
| Tubular Yield [ksi]: | 135 |
| Tubular PPF: | 10.4 |
| Calculated Highest Shear Pressure [psi] | |
| 1797 | |

P_{shear} = Calculated required operator shear pressure (psi)
 P_w = Wellbore pressure at time of shear (psi)
 σ_{yield} = Minimum yield strength of the tubular material
 ppf = Nominal weight of the tubular (pounds per foot)
 C_1 = Operator constant corresponding to the piston closing area
 C_2 = Operator constant corresponding to the piston rod opening area
 C_3 = Constant corresponding to shear ram type / pipe grade

| DIMENSIONAL METHOD - To be used if the shear pressure calculations require the pipe outside and inside diameter. | | | | | | | | | | |
|--|-------|-------|-------|-----|----|------|------|--------|---|---|
| | OD | Wall | ID | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
| Tubular Shear Data | 2.875 | 0.362 | 2.151 | 224 | 13 | 0.19 | 10.4 | 135000 | 1217 | 1797 |

| PPF METHOD - Calculates using the nominal weight of the tubular (pounds per foot). | | | | | | | |
|--|-----|----|------|------|--------|---|---|
| | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
| Tubular Shear Data | 224 | 13 | 0.19 | 10.4 | 135000 | 1191 | 1771 |

| Equations | PPF Method | Dimensional Method |
|-----------------------------------|--|---|
| No Wellbore Pressure (psi) | $P_{shear} = [C3 * ppf * \sigma_{yield}] / C1$ | $P_{shear} = [(C3 * \sigma_{yield}) * (pipeOD^2 - pipeID^2) * 2.92] / C1$ |
| Including Wellbore Pressure (psi) | $P_{shear} = [(C3 * ppf * \sigma_{yield}) + (Pw * C2)] / C1$ | $P_{shear} = [(C3 * \sigma_{yield}) * (pipeOD^2 - pipeID^2) * 2.92 + (Pw * C2)] / C1$ |



2810 Washington Drive
Houston, TX 77038-3319
Telephone: (281) 931-1400
Facsimile: (281) 931-8700
e-mail: sales@church-energy.com

ENGINEERING REPORT

REPORT NO.: ER112B
DATE: 06.24.10

TITLE: Test Report on Shear Ram performance performed at Church Energy Services facilities for a 13-5/8" 10000 psi W.P. Type U (Cameron) blowout preventer (BOP) equipped with large bore shear bonnets and shear boosters (LBT) with type ISR shear rams installed

DATE OF TEST: 17 June 2010

BACKGROUND: Church Energy Services was requested by Seahawk Drilling, Inc., Hercules Offshore, Inc. and Diamond Offshore to perform shear ram testing on 5" S-135 and 5" G-105 drill pipe used by both companies in their offshore drilling operations. This was initiated by a request from the United States MMS for verification of the equipment to perform its required function.

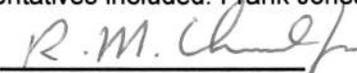
EQUIPMENT: A double ram Cameron Type U BOP was furnished by Seahawk Drilling in performing the shear tests. The BOP consisted of standard bonnets on the upper cavity and large bore shear bonnets on the lower cavity. Shear boosters were installed on the lower cavity. Shear rams and drill pipe were also furnished by Seahawk drilling. The rams were manufactured by Church Energy Services and the BOP had been recently remanufactured and re-certified by Church Energy Services. Hydrostatic test equipment and facilities were provided by Church Energy Services.

PROCEDURE: An 84" length of pipe was suspended into the BOP approximately midway across the shear rams. No attempt was made to center the pipe in the bore of the BOP. Strip chart recorders were used to monitor the closing pressure and bore pressures after shearing. No well bore pressure was used during the shearing operation. After shearing of the pipe, low pressure and the working pressure of the BOP were applied beneath the shear rams. A visual inspection of the shear rams was made between each shear test. After removal of the sheared pipe and shear rams, the rams were cleaned and surface NDE performed on the shearing blade surfaces.

SUMMARY: Church Energy Services supplied calculations for the predicted maximum operating shearing pressure of the 5" S-135 drill pipe to be approximately 2233 psi. The actual shearing operating pressure from the test was approximately 1000 psi (45% of calculated). The calculated maximum operating shearing pressure of the 5" G-105 drill pipe was to be approximately 2011 psi. The actual shearing operating pressure from the test was approximately 950 psi (47% of calculated). Visual inspection of the shear rams showed minor brinelling of the shear blade areas. Surface NDE showed no indications caused by the shear tests. The shear rams were dressed using emery paper by hand and were indistinguishable from a new set of shear rams.

ATTENDEES: The test was witnessed by numerous employees of Seahawk Drilling and Hercules Offshore along with other drilling contractor personnel and Church Energy employees.

Third Party representatives included: Frank Jones, Moduspec; I. M. Dobbie, ABS; Jarvis Outlaw, US MMS

PREPARED BY: 
Richard M. Church, Jr. P.E.

Attachments

TYPE CAMERON U RAM BLOWOUT PREVENTER
SHEAR TEST DATA

CUSTOMER: SEAHAWK / HERCULES

DATE: 06-17-2010

BOP size: 13-5/8"

Pressure: 10,000 psi

UPPER RAM SN 720007-000-1

BOP type: DOUBLE

LOWER RAM SN 720008-000-1

Bonnet type: LBT (Large Bore Shear with Boosters)

Ram type: ISR

Pipe / Tubular to shear: 5" 19.5 ppf S-135

Maximum allowable operating pressure of bonnet: 3000 psi

Is the pipe geometry acceptable per the requirements of PD220-01, Section 5.0? YES

Shear pressure, P_{Shear} calculated using the equation in PD220-01, Section 6.0: 2233 psi

PROCEDURE:

1. Lower the pipe into the BOP and suspend it approximately 3" above the blind flange.

2. Close the shear rams and monitor the pressure to shear.

Pressure to shear: 1000 psi

3. Apply pressure below the rams and hold for 10 mins.

a. Low Pressure: 200-300 psi Accept: YES

b. High Pressure: 10,000 psi Accept: YES

4. Open shear rams and remove from bonnets.

5. Inspect ram cavities and rams for damage.

Data recorded by:

R. Church
R. CHURCH /
Name / Signature

CHURCH ENERGY SERVICES
Company

06-17-2010
Date

Witness:

FRANK JONES
Name / Signature
I. H. DOBBIE

M. S. S. P. C.
Company
WITNESS
06/17/10

17/6/2010
Date

CAMERON TYPE U RAM BLOWOUT PREVENTER
REQUIRED SHEAR PRESSURE CALCULATION FORM

BY: R. M. Church, Jr.
Richard M. Church, Jr. P.E.

CUSTOMER: Seahawk / Hercules

RIG: N/A

LOCATION: N/A

DATE: 09-10-2010

OPERATOR: N/A

BOP Size: 13-5/8" Pressure: 10,000 psi

Bonnet Type: LBT (Large Bore Shear with Boosters) Booster size: 11"

Ram Type used: ISR

Pipe / Tubular to Shear: 5" 19.5 ppf S-135 (0.362" wall thickness)

Maximum Allowable Operating Pressure of Bonnet: 3000 psi

P_w (Wellbore Pressure at the time of the Shear): 0 psi

Is the pipe geometry acceptable per the requirements of PD220-01, Section 5.0? YES

INPUT VARIABLES:

C₁ = 224 BOP / Bonnet constant corresponding to the piston closing area

C₂ = 13 BOP / Bonnet constant corresponding to the piston rod opening area

C₃ = 0.19 Shear ram type / pipe grade constant

ppf = 19.5 lbf/ft

σ_{yield} = 135,000 Minimum Yield Strength of Pipe Material (psi)

Shear pressure, P_{Shear} is calculated using the following equation:

$$P_{\text{Shear}} = \left[\frac{(C_3)(ppf)(\sigma_{\text{yield}}) + (P_w)(C_2)}{C_1} \right]$$

P_{Shear} (Bonnet Shear Pressure) = 2233 psi

Therefore, since P_{Shear} is less than the maximum allowable operator pressure, the BOP is acceptable for the shearing operation.

Section 7

15

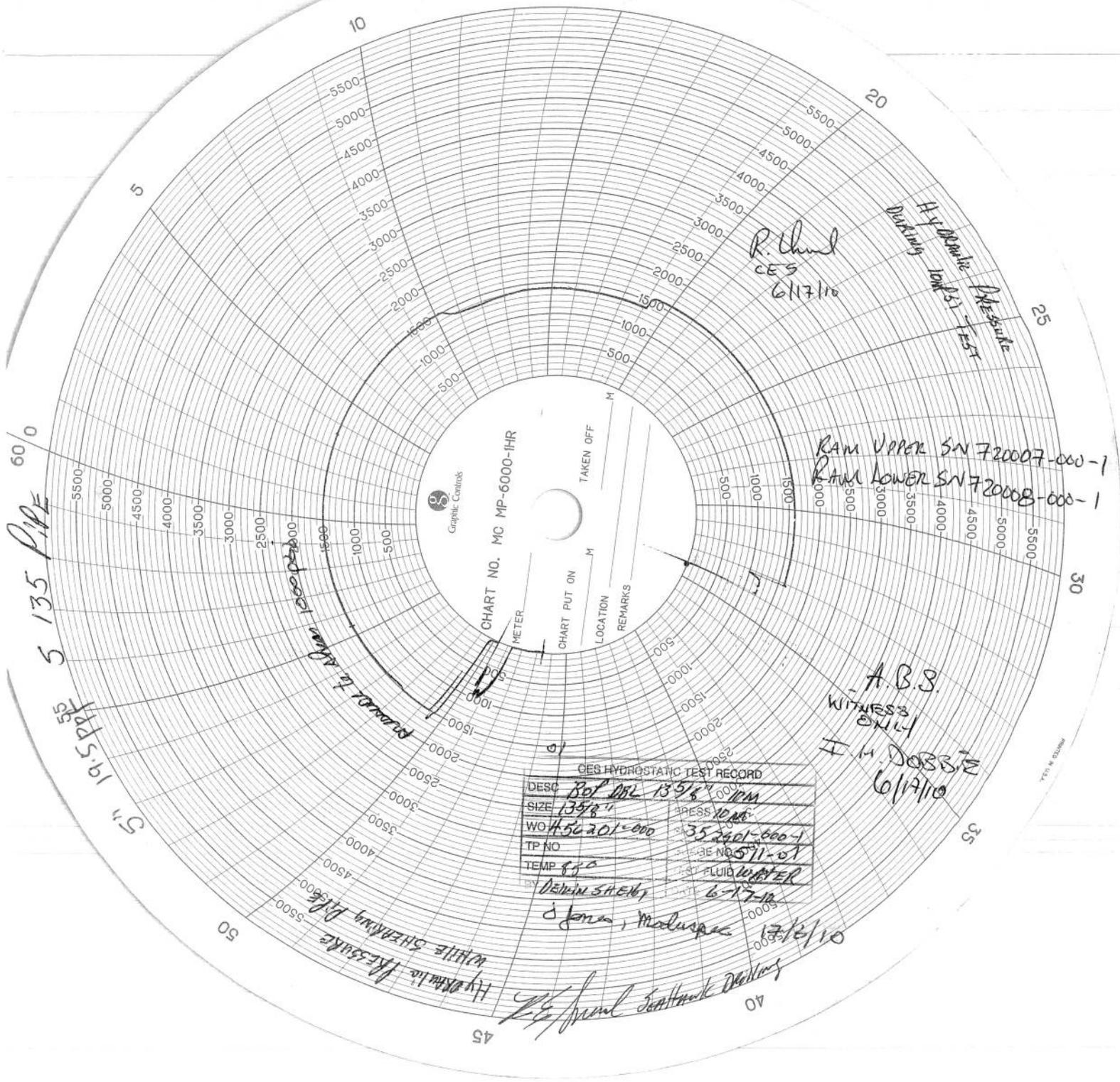


CHART NO. MC MP-6000-1HR
 METER
 CHART PUT ON
 LOCATION
 REMARKS
 TAKEN OFF

| CES HYDROSTATIC TEST RECORD | |
|-----------------------------|----------------------|
| DESC | Bot. Dbl 13 5/8" 10M |
| SIZE | 13 5/8" |
| WO | 456201-000 |
| TP NO | 352601-000-1 |
| TEMP | 85° |
| FLUID | WATER |
| DATE | 6-17-10 |

R. Chud
 CES
 6/17/10

RAM UPPER SN 720007-000-1
 RAM LOWER SN 720008-000-1

A.B.S.
 WITNESS
 ONLY
 I.M. DOBSON
 6/17/10

James, Madhusudan
 6/17/10

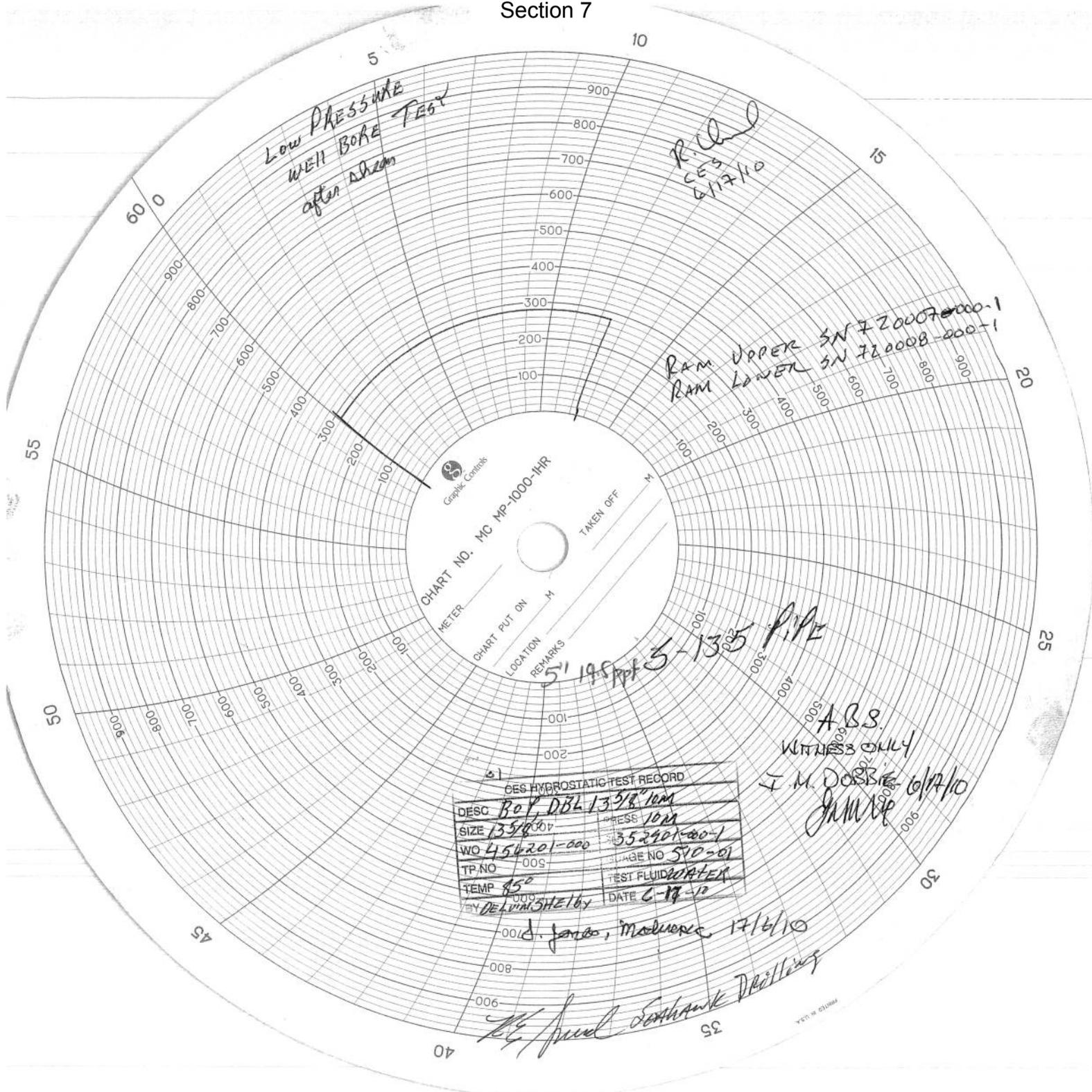
5" 135 PIPE
 5" 19.5 PPF

Hydraulic Pressure
 White Shering Pipe

Hydraulic Pressure
 Working 100 PSI - TEST

TEST ROOM

Section 7



| HYDROSTATIC TEST RECORD | |
|-------------------------|--------------------|
| DESC | BOY, DBL 13.5" 10M |
| SIZE | 13.5" 10M |
| WO | 454201-000 |
| TP NO | 005 |
| TEMP | 85° |
| BY | DELVINSHELY |
| DATE | 6-17-10 |
| TEST FLUID | WATER |
| STAGE NO | 510-01 |
| PRESS | 10M |
| W.O. NO | 352901-000-1 |

Section 7
15

WELL BORE TEST
10 min Hold
test after show sign

R. Church
CES
6/17/10

RAM UPPER SN 720007-000-1
RAM LOWER SN 720008-000-1

CHART NO. MC MP-30000-1HR



METER _____ TAKEN OFF _____
CHART PUT ON _____ M _____
LOCATION _____
REMARKS _____

5" 19.5ppf 5735 PIPE

A.B.S.
WITNESS
O.M.L.
I.M. DOBBIE
6/17/10

| CES HYDROSTATIC TEST RECORD | |
|-----------------------------|------------------|
| DESC BOP OBL 13 7/8" 10M | PRESS 10M |
| SIZE 13 7/8" | SN 352901-000-1 |
| WO 456201-000 | REG NO 509-01 |
| TP NO | TEST FLUID WATER |
| TEMP 85° | DATE 6-17-10 |
| BY DE/lin SHELBY | |

Frank Jones, Modesto 17/6/10

Signature

P.O. Box 577
 Brookshire, TX 77423
 U.S.A



Tel: (281) 375-5515
 Fax: (281) 934-1600
 west@westengineer.com

STATEMENT OF QUALIFICATIONS

Introduction

The Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) issued revisions to 30 CFR Part 250 to implement certain safety measures for Lessees regarding energy development on the OCS. Some include having an independent third party verify and/or certify specific capabilities of BOP and well control systems.

Qualifications

Per 30 CFR 250.416(g1); *“The independent third party must be a... licensed professional engineering firm capable of providing the verification required with this part.”* (See Items 1 - 13).

WEST:

1. is a registered Engineering firm in the state of Texas. A copy of our license is included. (See Section 9)
2. is a Well Control Equipment verification company, established in 1984, that places emphasis on technical excellence.
3. has conducted over 3700 surveys on WCE over the last 27 years for Operators and Contractors.
4. has 13 degreed engineers and 6 licensed professional engineers on staff.
5. draws upon the collective experience of a team of approximately 70 drilling equipment and BOP surveyors, each with an average field experience level of 19 years.
6. performs Failure Modes, Effects, and Criticality Analyses on a wide variety of drilling equipment ranging from Top Drives to Blow-Out Preventers and their control systems.
7. has created a database of Inspection and Test Procedures (ITPs) and Acceptance Test Procedures (ATPs) that detail procedures to ensure fitness-for-purpose.
8. maintains a database of Original Equipment Manufacturer product/engineering bulletins called RigLore, which serves as a single resource for manufacturer engineering history and record of design changes.
9. maintains continuously updated databases for drilling equipment anomalies and lessons learned. WEST also has a searchable failure database.
10. conducted 7 major technical studies over the past 15 years concerning WCE on topics including shear ram capabilities, secondary intervention methods in well control, high pressure high temperature BOP elastomer performance, BOP reliability, BOP multiplex control systems, and applicability of API recommended practices in US regulations. These studies help position WEST on the forefront of best available and safest technology (BAST).
11. provides specialized training and seminars on Well Control Equipment.
12. engineers participate in API standards committees. In this capacity, WEST is involved in revising API standards to meet the latest technological developments in drilling equipment.
13. engineers author and present SPE papers in peer reviewed events on a wide range of topics involving advanced drilling technology, the vast majority of which have been on BOP topics.

Per 30 CFR 250.416 (g2); ...*“the firm you are using is reputable, the firm and its employees hold appropriate licenses to perform the verification in the appropriate jurisdiction, the firm carries industry standard levels of professional liability insurance, and the firm has no record of violations of applicable law.”* (See Items 14 – 15).

WEST:

14. is a sufficiently capitalized, insured (limited to a maximum of \$1 million per incident), licensed professional engineering firm with no record of violations of applicable law (or ethical guidelines) and is willing to sign a certification under penalty of perjury. (See Sections 9, 10 & 11)
15. is an ISO 9001 certified company.

Jeffrey P. Sattler, P.E.
 Sr. Vice President, Engineering

**Texas Board of Professional Engineers
CERTIFICATE OF REGISTRATION**

This acknowledges that

***WEST HOU, INC.
DBA: WEST ENGINEERING SERVICES***

**has fulfilled the requirements of the Texas Board of Professional
Engineers to offer and perform engineering services in the state of Texas.**

**Registration Number
F-4672**

**Expiration Date
3/31/2012**

P.O. Box 577
Brookshire, TX 77423
U.S.A



Tel: (281) 375-5515
Fax: (281) 934-1600
west@westengineer.com

ISO 9001 Certified

02 August 2011

To Whom It May Concern:

As regards to the use of WEST's engineering professional status in commercial transactions, WEST states that no prior or present violation of applicable law has been charged by others.

Please contact us if you require any additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey P. Sattler", is written over a faint, larger version of the company logo.

Jeffrey P. Sattler,

For WEST Engineering Services, Texas Registration No. F-4672



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

7/27/2011

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| | | |
|---|------------------------------------|-----------------------------|
| PRODUCER Frank Crystal & Co of TX, Inc. 2000 West Loop S., Suite 1800 P.O. Box 27723 Houston TX 77227-7723 | CONTACT NAME: _____ | |
| | PHONE (A/C, No. Ext): _____ | FAX (A/C, No): _____ |
| E-MAIL ADDRESS: _____ | | |
| INSURER(S) AFFORDING COVERAGE | | NAIC # |
| INSURER A: Axis Insurance Company | | |
| INSURER B: _____ | | |
| INSURER C: _____ | | |
| INSURER D: _____ | | |
| INSURER E: _____ | | |
| INSURER F: _____ | | |

COVERAGES **CERTIFICATE NUMBER:** 571748096 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSR | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS |
|----------|--|-----------|----------|-----------------|-------------------------|-------------------------|--|
| | GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR _____ _____ GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC | | | | | | EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ _____ \$ |
| | AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS | | | | | | COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ _____ \$ |
| | UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED <input type="checkbox"/> RETENTION \$ | | | | | | EACH OCCURRENCE \$ AGGREGATE \$ _____ \$ |
| | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) <input type="checkbox"/> Y <input checked="" type="checkbox"/> N If yes, describe under DESCRIPTION OF OPERATIONS below | | | | | | WC STATUTORY LIMITS OTH-ER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$ |
| A | Professional Liability (Claims Made) | | | ECN000069801001 | 8/5/2010 | 8/5/2011 | Limit of Liability \$1,000,000 Retention \$100,000 |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

| | |
|---|---|
| CERTIFICATE HOLDER "To Whom It May Concern" | CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE <i>Frank Crystal & Co. of Texas, Inc.</i> |
|---|---|